

CLYTIA LAMOUROUX, 1812, LAOMEDEA
LAMOUROUX, 1812. AND CAMPANULARIA
LAMARCK, 1816 (COELENTERATA, HYDROIDA):
PROPOSED DESIGNATIONS OF TYPE SPECIES BY USE
OF THE PLENARY POWERS, AND COMMENTS ON
RELATED GENERA. Z.N.(S.)2326.

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1. Introduction

The marine hydroid family CAMPANULARIIDAE includes several intertidal and offshore genera widely known among biologists. One of these, *Obelia* Péron & Lesueur, 1810, p. 355, although originally based on the medusa stage, has become the best known of any genus of colonial hydroid; but the closely related *Laomedea* Lamouroux, 1812, p. 184, and *Campanularia* Lamarck, 1816, p. 112, are also well known. Another familiar genus in this family is *Clytia* Lamouroux, 1812, p. 184. There are long-standing nomenclatural problems concerning all these genera and some of the species in them. *Campanularia* and *Laomedea* have been confused by many authors, and some have used *Obelia* in place of *Laomedea*. Since the genera are comparatively well known the need for stability is pressing, but there is confusion also over the type species of these genera. The purpose of this paper is to propose designations of type species under the plenary powers of the Commission where necessary, to stabilise the generic nomenclature in this family. The proposals follow a world-wide generic revision of the family in which the need for the use of these powers has been made apparent (Cornelius, in prep.).

2. *Laomedea* and *Obelia*

2. The widely used genus name *Laomedea* Lamouroux, 1812, p. 184 (Coelenterata, Hydroida, CAMPANULARIIDAE), is a junior subjective synonym of another well known name, *Obelia* Péron & Lesueur, 1810, p. 355 (Cornelius 1975, pp. 253-254), and under the Code should not be used. But the genus to which the name *Laomedea* has been applied is found on the shores of all continents except Antarctica. Application of the Code would lead to *Laomedea* being dropped, and this would cause confusion.

3. The following references establish a *prima facie* case for the conservation of *Laomedea* under the provisions of Article 23. Each is an important work in which *Laomedea* was used as a valid name: Kramp, 1935, 1938; Vervoort, 1946; Leloup, 1952; Buchanan, 1957; Hamond, 1957; Marine Biological Association,

1957; Barrett & Yonge, 1958; Teissier, 1965; Robins, 1969.

4. Conservation of the name *Laomedea* can be conveniently achieved by designating as type species a species not originally included, so that there will no longer be any question of synonymy with the older name *Obelia*. The two species originally included in *Laomedea* were *Sertularia dichotoma* Linnaeus, 1758, p. 812 (now universally assigned to the 'medusa genus' *Obelia*) and *S. spinosa* Linnaeus, 1758, p. 812 (now assigned to the bryozoan genus *Vesicularia* Thompson, 1830, pp. 89, 97; e.g. Prenant & Bobin, 1956, p. 276); and neither could usefully be designated type species. Therefore, I propose that *Laomedea flexuosa* Alder, 1857, p. 122, a species not originally included, be designated type species of the genus *Laomedea* Lamouroux, 1812, by use of the plenary powers (paragraph 28). I define that genus as follows (after Cornelius, in prep.): colonial CAMPANULARIIDAE with: polyp generation forming upright colonies; stolon branching but not anastomosing; no hydrothecal spherule; true diaphragm present; hydranth with well developed hypostome; gonotheca aperture typically circular, wide; gonophores sessile, interpreted as vestigial medusae in species which have been closely studied.

5. It should be noted in passing that Broch (1905, p. 10) proposed that *Laomedea loveni* Allman, 1859, p. 138, should be type species of *Laomedea*; but *loveni* was not originally included. The valid species *loveni* has been widely referred to the genus *Gonothyraea* Allman, 1864, p. 374, a practice which seems biologically sound. Hence the Commission is not asked to ratify Broch's invalid designation.

3. *Campanularia*, *Orthopyxis* and *Rhizocaulus*

6. The well known genus name *Campanularia* Lamarck, 1816, p. 112, also presents problems which need action under the plenary powers. *Campanularia* had no type species validly designated until Nutting (1915, p. 28) selected *Sertularia verticillata* Linnaeus, 1758, p. 811. Naumov, 1960, p. 249 (repeated in translation in Naumov, 1969, p. 269) later designated *S. volubilis* Linnaeus, 1758, p. 811, as type species and Millard, 1966, p. 477 and Millard, 1975, p. 203, concurred; but Nutting's designation of *verticillata* has priority. However, there are difficulties resulting from Nutting's overlooked designation. The species *verticillata* stands out from the others in the genus *Campanularia* s. str. and some authors have removed it to its own genus. I agree with this action (Cornelius, in prep.).

7. Stechow, 1919, was the first to propose a genus to accommodate *S. verticillata* (and some dubious species similar in colony habit which he listed). For this genus he introduced the name *Rhizocaulus* Stechow, 1919, p. 852, type species *Sertularia*

verticillata Linnaeus, 1758, by original designation. It is proposed to retain the name *Rhizocaulus*, by setting aside Nutting's designation (paragraph 28).

8. Application of the Code would restrict *Campanularia* to *verticillata* and the few similar nominal species listed by Stechow, 1919, and Naumov, 1960, 1969. The familiar intertidal and shallow water species usually referred to *Campanularia* would need a new genus name. Since no familiar name is available confusion would be inevitable, so long as the generic separation of *verticillata* were upheld.

9. A second genus was later established to accommodate *S. verticillata* and one other species, namely *Verticillina* Naumov, 1960, pp. 9, 115, 122, 269 (also in translation in Naumov, 1969, pp. 6, 115, 123, 291); type species *Sertularia verticillata* Linnaeus, 1758, p. 811, by original designation. Although more pleasing than *Rhizocaulus*, the name *Verticillina* is clearly a junior objective synonym of *Rhizocaulus* since it has the same type species, and regrettably it should not be used.

10. It should again be noted in passing that Broch, 1905, p. 10, designated '*Campanularia caliculata* Hincks, 1853', p. 178 (lapsus for *caliculata*) as type species of *Campanularia*, but *caliculata* was not among the originally included species. The species *C. caliculata* is currently referred to the genus *Orthopyxis* J.L.R. Agassiz, 1862, pp. 297, 355 (type species by monotypy *Clytia* (*Orthopyxis*) *poterium* J.L.R. Agassiz, 1862, p. 297, subjectively regarded as conspecific with *caliculata* by Cornelius, in prep., and by others listed therein). *Orthopyxis* was introduced by Agassiz, 1862, as a subgenus of *Clytia* on page 297 of his work, including the 'new' species *poterium* alone; but on page 355 he upgraded *Orthopyxis* to genus. [Although employing the combination *Clytia poterium* in the 'Explanation of the plates' following page 380 of the main text, in the captions of plates 28 and 29 therein; and the lapsus *Clythia poterium* on the plates themselves. Nevertheless, the name *Orthopyxis* was validly introduced.] On page 355 of the work Agassiz, 1862, implicitly used the combinations '*Orthopyxis* (*Orthopyxis*) *poterium*', '*Orthopyxis* (*Campanularia*) *volubiliformis*' and '*Orthopyxis* (*Laomedea*) *integra*' of various authors). Thus *poterium* can rightly be regarded as type species by monotypy of the subgenus *Orthopyxis* Agassiz and of the genus *Orthopyxis* Agassiz.

11. There is some debate about whether *Orthopyxis* s. str. and *Campanularia* s. str. should be taken as one genus or two. Millard, 1975, combined them; but Ralph, 1957, and Cornelius, in prep., have upheld a separation. If the two genera are regarded as distinct, then I believe none would doubt that *caliculata* would

ideally go into *Orthopyxis*, and not into *Campanularia*. Hence Broch's, 1905, invalid designation of '*calyculata*' as type species of *Campanularia* would, if accepted, prove confusing. A new genus name would have to be found for *Campanularia* auctorum. No familiar name is available, and the Commission is not asked to ratify Broch's invalid proposal.

12. I therefore propose that *Sertularia volubilis* Linnaeus, 1758, p. 811, should be designated as type species of *Campanularia* by use of the plenary powers. *Campanularia* could then still be used sens. auct.; and the species *S. verticillata* would become known as *Rhizocaulus verticillatus*, which is taxonomically acceptable.

13. The remaining species once assigned to *Campanularia* in the sense of, for example, Hincks, 1868, and Bedot, 1901-1925, would have to be placed in other genera, in keeping with some previous opinions. These genera would be: *Laomedea* Lamouroux, 1812 (as defined here); the acceptable genus *Hartlaubella* Poche, 1914, p. 76 (to accommodate *Sertularia gelatinosa* Pallas, 1766, p. 116, alone; discussion in Cornelius, in prep.); and the unacceptable *Paracalix* Stechow, 1923a, p. 3, which under the Code is available to receive the remainder.

14. The name *Paracalix* has not been used since it was introduced. The type species of *Paracalix*, namely *Campanularia pulcrathea* Mulder & Trebilcock, 1914, p. 11 (by monotypy), was based on a deformed specimen of *Campanularia* sp., possibly *C. volubilis* (Linnaeus, 1758); so that there are strong subjective grounds for regarding *Paracalix* and *Campanularia* as congeneric. Unless the name *Campanularia* were given the meaning proposed here (paragraphs 6-16, 28) *Paracalix* would replace *Campanularia*, to the detriment of established usage. But designating *C. volubilis* (Linnaeus, 1758) as type species of *Campanularia* would make *Paracalix* a very safe junior subjective synonym of *Campanularia*, and the problem would be resolved. It seems unlikely that the type species of *Paracalix* would ever again be regarded as a valid species by a serious worker. But if it were, then if necessary it could be removed to the genus *Paracalix* without affecting the stability of the name *Campanularia*.

15. If the rules were applied and the genus name *Campanularia* were restricted to the large, upright-growing species *Sertularia verticillata* Linnaeus, 1758, and the few closely allied species taxa listed in Stechow, 1919, and Naumov, 1960, 1969, then *Campanularia* would no longer be available for the remainder of the genus sens. auct.; that is for the small, stoloniferous species with which the name is usually associated. This would cause confusion among a wide variety of biologists ranging from advanced course students and their teachers to developmental physiologists,

ecologists and others engaged in research. Conservation of the existing widespread use (but not necessarily the sense) of *Campanularia*, and stability, would be achieved by setting aside Nutting's designation of *S. verticillata* Linnaeus, 1758, as type species of *Campanularia*; and admitting Naumov's (1960) designation of *S. volubilis* Linnaeus, 1758. I define the genus *Campanularia* as follows (after Cornelius, in prep.): stoloniferous and colonial CAMPANULARIIDAE, stolon not anastomosing; hydrothecae borne on pedicels inserted on the stolon at irregular intervals; sub-hydrothecal spherule present; hydrothecal diaphragm absent; no medusa stage. This definition expressly excludes the genus *Orthopyxis* J.L.R. Agassiz, 1862, pp. 297, 355, as redefined by Ralph, 1957, p. 834, and by Cornelius, in prep. But it happens that the species of *Orthopyxis* do not impinge on the immediate discussion.

16. It should be stressed that the proposed type species of *Campanularia* Lamarck, 1816, is *Sertularia volubilis* Linnaeus, 1758 (= *C. volubilis* sens. auct., e.g. Hincks, 1868) and not *S. volubilis* sens. Ellis & Solander, 1786, p. 51 (usually subjectively referred to *Clytia hemisphaerica* (Linnaeus, 1767); details in Millard, 1966, p. 477 and Cornelius, in prep.). This point is particularly important since '*Sertularia volubilis* Ellis & Solander' was designated as type species of the genus *Clytia* Lamouroux, 1812, p. 184, by Mayer, 1910, p. 262. Since this is not the same as *S. volubilis* Linnaeus, 1758, *Clytia* is a genus based on a misidentified type species. Under Article 70a(i) the Commission is invited to use its plenary powers to designate the species that Ellis & Solander had before them, namely, *Campanularia johnstoni* Alder, 1856a, p. 359, as type species of the genus *Clytia* Lamouroux, 1812. The reasons are as follows. Ellis & Solander included among their indications of *S. volubilis* an illustration with a binominal name, that is to say *Sertularia uniflora* Ellis, 1768, pl. 19, fig. 9 (there being no related text). The Ellis, 1768, engraving was that used in the later, Ellis & Solander work so that the two names are objectively linked. However, the combination *Sertularia uniflora* had been used still earlier, by Pallas, 1766, p. 121, and Ellis's usage was homonymous. [The Pallas species was in fact a junior objective synonym of *S. volubilis* Linnaeus, 1758 — the other species; details in Cornelius, in prep.] The earliest unpreoccupied name which it is possible to link unequivocally with *S. uniflora* sens. Ellis, 1768, is *Campanularia johnstoni* Alder, 1856a, pp. 359–360, pl. 13, fig. 8. Alder in his text related *johnstoni* to the illustration of Ellis & Solander, 1786. The type species of the genus *Clytia* Lamouroux, 1812, should, therefore, be known as *Clytia johnstoni* (Alder, 1856a). Most authors have taken *C. johnstoni* to be subjectively conspecific with

Medusa hemisphaerica Linnaeus, 1767 (= *Clytia hemisphaerica* auct.); but the two are respectively hydroid and medusa stages in a genus with many unsolved taxonomic problems and there are still some doubts that they represent the same species (discussion in Cornelius, in prep.).

17. Lamouroux, 1812, originally included three species in *Clytia*, cited as '*Sertularia volubilis* Ell.', '*S. syringa* Ell.' and '*S. verticillata* Ell.'. The references must be to Ellis & Solander, 1786, and not to Ellis, 1755, since binominal names occur only in the later work. The nominal species concerned, as it happens, were all included in Linnaeus, 1758.

18. Although the name *Medusa hemisphaerica* Linnaeus, 1767, has been attributed to Gronovius 1760, p. 38, by some authors his usage was not strictly binominal (Millard, 1966, p. 477). Similarly, Bedot's implication (1901, p. 486) that Houttuyn, 1770, p. 423, might have introduced the name *hemisphaerica* so early as 1761, is misleading. Houttuyn did not use the words '*Medusa hemisphaerica*' in a binominal sense; and the volume in which they appeared was dated 1770, conveniently following most of the other early works in question.

19. Lastly, *Medusa hemisphaerica* Linnaeus, 1767, is type species of the genus *Thaumantias* Eschscholtz, 1829, p. 102 (designated by Forbes, 1848, p. 41). *Thaumantias* is hence a junior subjective synonym of *Clytia*. The name *Thaumantias* was once widely used but no longer finds a place in standard works (e.g. Kramp, 1961). The subjective synonymy of *hemisphaerica* with the type species of *Clytia* [namely *C. johnstoni* (Alder, 185a; see paragraph 16)] is so strong as to make unlikely the future resurrection of *Thaumantias*. Even if the two species were recognized it is most improbable that they would be placed in separate genera.

4. Other names

20. If the present proposals are adopted certain unfamiliar genus and subgenus names will fall, to the advantage of hydroid nomenclature.

21. The genus *Campalaria* Hartlaub, 1897, p. 449, was introduced to embrace solely the nominal species *Campalaria conferta* Hartlaub, 1897. The name *Campalaria* has apparently been used only once since its introduction, by Hamond, 1957, p. 315, in the combination *Laomedea (Campalaria) conferta*. The species, itself now regarded as invalid (Cornelius, in prep.), falls within the generic diagnosis given for *Laomedea* in paragraph 4; and if the proposals in paragraph 28 are accepted, the genus name *Campalaria* will be regarded as a junior subjective synonym of *Laomedea* as here understood. If the proposals are not accepted,

then *Campalaria* would have to replace *Laomedea*, to the detriment of established usage.

22. The subgenus *Eulaomedea* Broch, 1910, p. 189, has as type species *Laomedea flexuosa* Alder, 1857, p. 122, by monotypy. The name would fall as a junior objective synonym of *Laomedea*. Stechow, 1923b, p. 95, referred *Eulaomedea* to *Laomedea*, not recognizing the subgenus, a course with which I agree. But Splettstösser, 1924, p. 424, and Hummelinck, 1936, pp. 51, 57, interpreted the subgenus *Eulaomedea* widely, that is in the sense in which the authors listed in paragraph 3 understood the genus *Laomedea*. The genus name *Laomedea* was applied by Broch, 1910, 1928, Splettstösser, 1924, and Hummelinck, 1936, to a large group of species comprising, they said, three subgenera: *Eulaomedea* (= *Laomedea* s. str.), *Obelia* Péron & Lesueur, 1810, and *Gonothyraea* Allman, 1864. But the great majority of authors have used *Laomedea* in the narrow sense and regarded it and *Obelia* and *Gonothyraea* as full genera.

23. Apart from subgeneric use without comment by Vervoort, 1946, pp. 284–285, also Vervoort, 1959, p. 316, the name *Eulaomedea* was not used again until Rees & Thursfield, 1965, p. 101, employed it as a genus name, but likewise without proper explanation. Rees wrote: 'The reason for adopting *Eulaomedea* in preference to *Laomedea* will be discussed elsewhere; it is sufficient here to state that the type species of *Laomedea* is a true *Obelia* producing [a] medusa'; indicating that he had realized the synonymy between *Obelia* and *Laomedea* mentioned in paragraph 2. The only other use of *Eulaomedea* of which I am aware was by Millard, 1975, p. 223, who did not comment on the nomenclatural problems and who used the name in the sense of *Laomedea* as understood here. Reversing my previous opinion (Cornelius, 1975, pp. 253–254) I recommend conserving the name *Laomedea* s. str. Although *Eulaomedea* is available under the Code it has hardly been used. In any case, the oldest available name for the genus under discussion would be *Campalaria* (see paragraph 21), not *Eulaomedea*.

24. The subgenus *Paralaomedea* was apparently introduced by Broch, 1928, p. 74, as *Laomedea* (*Paralaomedea*). The taxon was actually first proposed and defined by Splettstösser, 1924, pp. 424–425, but given neither formal subgeneric rank nor a name. Broch, 1928, gave it both, applying the new name *Paralaomedea*. The subgenus has always included only the species *Laomedea neglecta* Alder, 1856b, p. 440, pl. 16, figs 1–2, which is type species by monotypy. Hummelinck, 1936, p. 51, and Vervoort, 1946, p. 285, followed Broch's usage, Vervoort only in his key to species; but the name seems otherwise unused. I have concurred

(Cornelius, in prep.) with these authors that there *might* be a case for referring the species *neglecta* to a supra-specific taxon distinct from other species of *Laomedea*, on the basis of its reproductive structures. But the acknowledged medusoid nature of the female gonophore of *neglecta*, described by Spletstösser, 1924, suggests that there are not good grounds for a separation. But if a separation were upheld the name *Paralaomedea* would be both available and acceptable taxonomically. Meanwhile, and subject to the present proposals being accepted, I regard the subgenus *Paralaomedea* as a junior subjective synonym of the genus name *Laomedea*.

25. Broch, 1910, p. 184, and Broch, 1928, p. 73, referred all CAMPANULARIIDAE lacking a hydrothecal diaphragm to the genus *Campanularia* Lamarck, 1816. He recognized two subgenera: *Clytia* Lamouroux, 1812, in which medusa release occurred; and *Eucampanularia* Broch, 1910, p. 184, in which the gonophore was sessile (i.e. in which the medusa was retained and vestigial). Hummelinck, 1936, p. 49-50, and Vervoort, 1946, pp. 268-269, followed Broch's, 1910, usage. But all subsequent workers have understood the genus *Campanularia* in the more restricted sense, equivalent to Broch's subgenus *Eucampanularia*; and have reinstated *Clytia* to full genus status. The subgeneric name *Eucampanularia* has apparently not been used again. The genera *Clytia* and *Campanularia* s. str. (=Broch's *Eucampanularia*) have been widely regarded as distinct, and there seems no value to classification in following Broch (1910, 1928) in uniting them as subgenera of a single genus. Further, his action was nomenclaturally invalid since it is logically untenable to treat *Clytia* Lamouroux, 1812, as a subgenus of the younger genus *Campanularia* Lamarck, 1816.

26. The species *Sertularia volubilis* Linnaeus, 1758, p. 811, has been designated type species of *Eucampanularia* Broch, 1910 (by Cornelius, in prep.). If the present proposal is adopted, that *volubilis* should become type species of *Campanularia* Lamarck, 1816, then the subgenus name *Eucampanularia* Broch, 1910, would fall in the objective synonymy of the genus name *Campanularia* Lamarck, 1816 (see paragraph 28).

27. Some names derived from *Campanularia* and *Laomedea* are considered as unjustified emendations or incorrect subsequent spellings (Cornelius, in prep.), and hence as invalid or not available: *Campanula* Westendorp, 1843, p. 23; *Lomedea* Dana, 1846, p. 689; *Campanulata* J.L.R. Agassiz, 1862, p. 354; *Clytea* Wright, 1862, p. 308; *Clythia* J.L.R. Agassiz, 1862, pl. 28; *Clythia* van Beneden, 1866, p. 166; *Cmpanularia* Mulder & Trebilcock, 1914, p. 11; *Laomedea* Nutting, 1915, p. 123; *Eulaomeda* Rees & Thursfield, 1965, p. 102.

5. Proposals

28. To preserve the established use of the genus names *Laomedea* Lamouroux, 1812, and *Campanularia* Lamarck, 1816, the Commission is therefore requested:

(1) to use its plenary powers:

- (a) to set aside all designations of type species hitherto made for the nominal genus *Laomedea* Lamouroux, 1812, and having done so to designate the nominal species *Laomedea flexuosa* Alder, 1857, as type species of that genus;
- (b) to set aside all designations of type species for the nominal genus *Campanularia* Lamarck, 1816, other than that of *Sertularia volubilis* Linnaeus, 1758, by Naumov, 1960;
- (c) to set aside all designations of type species for the nominal genus *Clytia* Lamouroux, 1812, and having done so to designate the nominal species *Campanularia johnstoni* Alder, 1856a, as type species of that genus;

(2) to place on the Official List of Generic Names in Zoology:

- (a) *Laomedea* Lamouroux, 1812 (gender: feminine), type species, by designation under the plenary powers in (1) (a) above, *Laomedea flexuosa* Alder, 1857;
- (b) *Campanularia* Lamarck, 1816 (gender: feminine), type species, by designation by Naumov, 1960, ratified by use of the plenary powers in (1) (b) above, *Sertularia volubilis* Linnaeus, 1758;
- (c) *Clytia* Lamouroux, 1812 (gender: feminine), type species, by designation under the plenary powers in (1) (c) above, *Campanularia johnstoni* Alder, 1856a;

(3) to place on the Official List of Specific Names in Zoology:

- (a) *flexuosa* Alder, 1857, as published in the binomen *Laomedea flexuosa* (specific name of type species of *Laomedea* Lamouroux, 1812);
- (b) *volubilis* Linnaeus, 1758, as published in the binomen *Sertularia volubilis* (specific name of type species of *Campanularia* Lamarck, 1816);
- (c) *johnstoni* Alder, 1856a, as published in the binomen *Campanularia johnstoni* (specific

name of type species of *Clytia* Lamouroux, 1812).

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REFERENCES

- AGASSIZ, J.L.R., 1862. *Contributions to the natural history of the United States of America. Second monograph*. Vol. 4. Boston (Little, Brown & Co.) and London (Trübner & Co.), pp. i-viii, 1-381, (1)-(12), pls 20-35, text-figs 1-50.
- ALDER, J., 1856a. A notice of some new genera and species of British hydroid zoophytes. *Ann. Mag. nat. Hist.* (2) vol. 18, pp. 353-362.
- 1856b. Descriptions of three new British zoophytes. *Ann. Mag. nat. Hist.* (2) vol. 18, pp. 439-441.
- 1857. A catalogue of the zoophytes of Northumberland and Durham. *Trans Tyneside Nat. Fld Cl.* vol. 3, pp. 93-162. (Although the wrapper date is 1856, a footnote on p. 87 of the volume is dated 29 January, 1857.)
- ALLMAN, G.J., 1959. Notes on the hydroid zoophytes. *Ann. Mag. nat. Hist.* (3) vol. 4, pp. 137-144.
- 1864. On the construction and limitation of genera among the Hydroida. *Ann. Mag. nat. Hist.* (3) vol. 13, pp. 345-380.
- BARRETT, J.H., & YONGE, C.M., 1958. *Collins pocket guide to the sea shore*. London (Collins), pp. 1-272, pls 1-40 + I-XL, text-figs 1-179.
- BEDOT, M., 1901. Matériaux pour servir à l'histoire des hydroïdes. 1re période. *Revue suisse Zool.* vol. 9, pp. 379-515.
- 1905. Matériaux pour servir à l'histoire des hydroïdes. 2me période (1821 à 1850). *Revue suisse Zool.* vol. 13, pp. 1-183.
- 1910. Matériaux pour servir à l'histoire des hydroïdes. 3me période (1851 à 1871). *Revue suisse Zool.* vol. 18, pp. 189-490.
- 1912. Matériaux pour servir à l'histoire des hydroïdes. 4me période (1872 à 1880). *Revue suisse Zool.* vol. 20, pp. 213-469.

- 1916. Matériaux pour servir à l'histoire des hydroïdes. 5me période (1881 à 1890). *Revue suisse Zool.* vol. 24, pp. 1-349.
- 1918. Matériaux pour servir à l'histoire des hydroïdes. 6me période (1891 à 1900). *Revue suisse Zool.* vol. 26 (Suppl.), pp. 1-376.
- 1925. Matériaux pour servir à l'histoire des hydroïdes. 7me période (1901 à 1910). *Revue suisse Zool.* vol. 32 (Suppl.), pp. 1-657.
- BENEDEN, P.-J. VAN, 1866. Recherches sur la faune littorale de Belgique (Polypes). *Mém. Acad. R. Sci. Lett. Belg.* vol. 36 (2), pp. 1-207.
- BROCH, H., 1905. Nordsee-Hydroiden von dem norwegischen Fischereidampfer 'Michael Sars' in den Jahren 1903-1904 gesammelt, nebst Bemerkungen Über die Systematik der Tecaphoren Hydroiden. *Bergens Mus. Arb.* (1905) (6), pp. 1-26.
- 1910. Die Hydroiden der arktischen Meere. *Fauna arct.* vol. 5, pp. 127-248.
- 1928. Hydrozoa I. *Tierwelt N.-u. Ostsee* vol. 3(b), pp. 1-100.
- BUCHANAN, J.B., 1957. The hydroid fauna of the Gold Coast. *Revue Zool. Bot. afr.* vol. 56, pp. 349-372.
- CORNELIUS, P.F.S., 1975. The hydroid species of *Obelia* (Coelenterata, Hydrozoa: Campanulariidae), with notes on the medusa stage. *Bull. Br. Mus. nat. Hist. (Zool.)* vol. 28, pp. 249-293.
- (In preparation.) Hydroids and medusae of the family Campanulariidae recorded from the eastern North Atlantic, with a World synopsis of genera. *Bull. Br. Mus. nat. Hist. (Zool.)*
- DANA, J.D., 1846, 1849. *United States Exploring Expedition during the years 1838, 1839, 1840, 1841, 1842. Under the Command of Charles Wilkes, U.S.N. Zoophytes.* Philadelphia (Lea & Blanchard), vol. 1 (1846) text, pp. i-vii, 1-740; vol. 2 (1849) atlas, pp. 1-12, pls 1-61. (Dating of this work follows Haskell, 1942, pp. 50, 54.)
- ELLIS, J., 1755. *An essay towards a natural history of the corallines, and other marine productions of the like kind, commonly found on the coasts of Great Britain and Ireland.* London (John Ellis [himself]), pp. i-xvii, 10 pp. of contents (unpaginated), 1-103, pls 1-38 + one unnumbered.
- 1768. An account of the *Actina sociata*, or clustered animal-flower, lately found on the sea-coasts of the new-ceded Islands. *Phil. Trans. R. Soc. London* (1767) vol. 57, pp. 428-437.
- & SOLLANDER, D.C., 1786. *The natural history of many curious and uncommon zoophytes, collected from various parts of the globe.* London (B. White & P. Elmsly), pp. i-xii, 1-206, pls 1-63 + pp. 207-208 following. Edited by Martha Watt.
- ESCHSCHOLTZ, F., 1829. *System der Acalephen.* Berlin (F. Dümmler), pp. i-vi (p. vi being misnumbered iv), 1-190, pls 1-16.
- FORBES, E., 1848. *A monograph of the British naked-eyed medusae: with figures of all the species.* London (Ray Society), pp. i-vi (unnumbered), 1-104, pls 1-13.
- GRONOVIVS L.-T., 1760. Observationes de animalculis aliquot marinae aquae innatantibus atque in littoribus Belgicis obviis. *Acta helv.* vol. 4, pp. 35-40.
- HAMOND, R., 1957. Notes on the Hydrozoa of the Norfolk coast. *J. Linn. Soc. London (Zool.)* vol. 43, pp. 294-324.

- HARTLAUB, C., 1897. Die Hydromedusen Helgolands. Zweiter Bericht. *Wiss. Meeresunters. Helgol. (N.F.)* vol. 2 (Heft 1), pp. 449-536.
- HASKELL, D.C., 1942. *The United States Exploring Expedition, 1838-1842 and its publications 1844-1874*. New York (The New York Public Library), pp. i-xii, 1-188, pls 1-5 (unnumbered).
- HINCKS, T., 1853. Further notes on British zoophytes, with descriptions of new species. *Ann. Mag. nat. Hist.* (2) vol. 11, pp. 178-185.
- 1868. *A history of the British hydroid zoophytes*. London (Van Voorst), vol. 1 (text) pp. i-lxvii, 1-338, text-figs 1-45, frontis.; vol. 2 (plates) pls 1-67. (In most copies each plate carries the date 1869, but in some the date is 1868. All examples of vol. 2 I have seen have the title page dated 1868, regardless of the date on each plate.)
- HOUTTUYN, M., 1770. *Natuurlyke Historie of uitvoerige beschryving der Dieren, Planten en Mineraalen, volgens het Samenstel van den Heer Linnaeus. Met naauwkeurige Afbeeldingen. Eerste Deels, veertiende Stuk. De Wormen en Slakken*. Amsterdam (De Erven van F. Houttuyn), pp. i-vi, 1-532.
- HUMMELINCK, P.W., 1936. Hydropoliepen. *Flora Fauna Zuiderzee* (Suppl.), pp. 41-64.
- KRAMP, P.L., 1935. Polypdyr (Coelenterata). I. Ferskvandspolpypper og Goplepolypper. *Danm. Fauna* vol. 41, pp. 1-208.
- 1938. Marine Hydrozoa, a. Hydroida. *Zoology Iceland* vol. 2(5A), pp. 1-82.
- 1961. Synopsis of the medusae of the World. *J. mar. biol. Ass. U.K.* vol. 40, pp. 1-469.
- LAMARCK, J.B.P.A. DE, 1816. *Histoire naturelle des animaux sans vertèbres*. Vol. 2. Paris (Verdière), pp. 1-568.
- LAMOUREUX, J.V.F., 1812. Extrait d'un mémoire sur la classification des polypiers coralligènes non entièrement pierreux. *Nouv. Bull. sci. Soc. philom. Paris* vol. 3, pp. 181-188.
- LELOUP, E., 1952. Coelentérés. *Faune Belg.*, pp. 1-283.
- LINNAEUS, C., 1758. *Systema naturae*. 10th edition. Vol. 1. Holmiae (L. Salvii), pp. i-iv, 1-824.
- 1767. *Systema naturae*. 12th edition. Vol. 1, pars 2. Holmiae (L. Salvii), pp. 533-1328 + 36 pp. of indexes and appendix, unpaginated.
- MARINE BIOLOGICAL ASSOCIATION, 1957. *Plymouth marine fauna*. Plymouth (Marine Biological Association of the U.K.), 3rd edition, pp. i-xliii, 1-460.
- MAYER, A.G., 1910. *Medusae of the World. Volume II. The hydromedusae*. Washington (Carnegie Institution), pp. 231-498, i-xv, pls 30-55, text-figs 121-327.
- MILLARD, N.A.H., 1966. The Hydrozoa of the south and west coasts of South Africa. Part III. The Gymnoblastera and small families of Calyptoblastera. *Ann. S. Afr. Mus.* vol. 48, pp. 427-487.
- 1975. Monograph on the Hydroida of southern Africa. *Ann. S. Afr. Mus.* vol. 68, pp. 1-513.
- MULDER, J.F., & TREBILCOCK, R.E., 1914. Victorian Hydroida. With description of new species. *Geelong Nat.* vol. 6, pp. 6-15.
- NAUMOV, D.V., 1960. Gidroidy i gidromeduzy morskikh, solonovatovodnykh

- i presnovodnykh basseinov S.S.S.R. *Fauna S.S.S.R.* vol. 70, pp. 1-626.
- 1969. Hydroids and hydromedusae of the U.S.S.R. *Fauna S.S.S.R.* vol. 70, pp. 1-660. (Israel Program for Scientific Translations cat. no. 5108.)
- NUTTING, C.C., 1915. American hydroids. Part III. The Campanularidae and the Bonneviellidae. *Spec. Bull. U.S. natn. Mus.*, pp. 1-126.
- PALLAS, P.S., 1766. *Elenchus zoophytorum*. The Hague (F. Varrentrapp), pp. i-xxvii, 1-451.
- PÉRON, F., & LESUEUR, C.-A., 1810. Tableau des caractères génériques et spécifiques de toutes les espèces de méduses connues jusqu'à ce jour. *Annls. Mus. Hist. nat. Paris* (1809) vol. 14, pp. 325-366. (Dating follows Sherborn, C.D., 1914, *Ann. Mag. nat. Hist.* (8) vol. 13, pp. 365-368.)
- POCHE, F., 1914. Das sytem der Coelenterata. *Archiv. Naturgesch.* vol. 80 (Abt. A, Heft 5), pp. 47-128.
- PRENANT, M., & BOBIN, G., 1956. Bryozoaires. Première partie. Entoproctes, phylactolèmes, cténostomes. *Faune Fr.* vol. 60, pp. 1-398.
- RALPH, P.M., 1957. New Zealand thecate hydroids. Part I. Campanulariidae and Campanulinidae. *Trans. R. Soc. N.Z.* vol. 84, pp. 811-854.
- REES, W.J., & THURSFIELD, S., 1965. The hydroid collections of James Ritchie. *Proc. R. Soc. Edinb.* (B) vol. 69, pp. 34-220.
- ROBINS, M.W., 1969. The marine flora and fauna of the Isles of Scilly. Cnidaria and Ctenophora. *J. nat. Hist.* vol. 3, pp. 329-343.
- SPLETTSTÖSSER, W., 1924. Beiträge zur Kenntnis der Gattung *Laomedea* (sensu Broch). *Zool. Jb.* (Syst.) vol. 48, pp. 367-432.
- STECHOW, E., 1919. Neue Ergebnisse auf dem Gebiete der Hydroidenfor-schung. *Münchener Med. Wochenschr.* (1919) vol. 30, pp. 852-853.
- 1923a. Neue Hydroiden der Deutschen Tiefsee-Expedition, nebst Bemerkungen über einige andre Formen. *Zool. Anz.* vol. 56, pp. 1-20.
- 1923b. Zur Kenntnis der Hydroidenfauna des Mittelmeeres, Amerikas und anderer Gebiete. II Tiel. *Zool. Jb.* (Syst.) vol. 47, pp. 29-270.
- TEISSIER, G., 1965. *Inventaire de la faune marine de Roscoff. Cnidaires - cténaires*. Roscoff (Station Biologique de Roscoff), pp. 1-64.
- THOMPSON, J.V., 1830. Memoir V. On Polyzoa, a new animal discovered as an inhabitant of some zoophytes - with a description of the newly instituted genera of *Pedicellaria* and *Vesicularia*, and their species. *Zoological Researches, and Illustrations: or natural History of non-descript or imperfectly known animals*, vol. 1 (4), pp. 89-102. (Dating of this work follows Sherborn, C.D., 1922, *Index Animalium* part 1, p. cxxii.)
- VERVOORT, W., 1946. Hydrozoa (C I). A. Hydropolypen. *Fauna Ned.* vol. 14, pp. 1-336.
- 1959. The Hydroida of the tropical west coast of Africa. *Atlantide Rep.* vol. 5, pp. 211-325.
- WESTENDORP, G.D., 1843. Recherches sur les polypiers flexibles de la Belgique et particulièrement des environs d'Ostende. *Annls Soc. Médico-Chirurgicale Bruges* vol. 4, pp. ? (not seen). (Reprinted with same title, 1843, Bruges (F. de Pachtère), pp. 1-48, pl. 1; seen.)
- WRIGHT, T.S., 1862. On the reproduction of *Thaumantias inconspicua*. *Q. J. microsc. Sci.* (N.S.) vol. 2, pp. 221-222, 308.